Barstow Marine Corps Logistics Base
Barstow, California

Engineering Field Division/Activity: SOUTHWESTDIV

Major Claimant: CMC

Size: 5,688 Acres

Funding to Date: $56,610,000

Estimated Funding to Complete: $75,880,000

Base Mission: Originally conducted industrial operations; currently maintains, repairs, rebuilds, stores and distributes supplies and equipment

Contaminants: Heavy metals, PCBs, POLs, pesticides/herbicides, volatile organic compounds, dichloroethane, ethylene dibromide, tetra-chloroethylene, trichloroethylene

Number of Sites:		Relative Risk Ranking of Sites:			
CERCLA:	39	High:	10	Not Evaluated:	1
RCRA Corrective Action:	0	Medium:	4	Response Complete:	0
RCRA UST:	2	Low:	26	Total Sites:	41
Total Sites:	41				

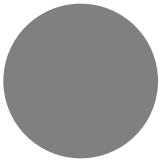
NPL

EXECUTIVE SUMMARY

Marine Corps Logistics Base (MCLB) Barstow is located directly east of the City of Barstow, in the central Mojave Desert, about halfway between Los Angeles and Las Vegas. MCLB Barstow consists of three separate, distinct areas: the Nebo and Yermo Annexes and the Rifle Range. The Nebo Annex houses most of the Base's administrative activities: Base housing, military and dependent support facilities, and covered storage for warehousing activities. The Yermo Annex is utilized mainly for industrial maintenance, repair and rebuild activities. The Rifle Range provides a secured area where Marines can practice and improve their marksmanship skills. Typical operations that contributed to contaminated sites on the facility include: vehicle maintenance, weapons repair and maintenance, missile systems maintenance and repair, communications, electronics repair, machine shop, petroleum products and chemical storage and an Industrial Wastewater Treatment Plant (IWTP). Current operations include pollution prevention technologies to prevent further contamination. MCLB Barstow was listed on the National Priorities List (NPL) in November 1989 due to the detection of the organic solvent TCE in groundwater monitoring wells. MCLB Barstow signed a Federal Facility Agreement (FFA) with EPA and California regulatory agencies in October 1990.

The Nebo, Rifle Range and Yermo areas of MCLB Barstow are all fairly well isolated from neighboring communities which are located 1/4 to 1 mile from facility boundaries. Commercial land development adjacent to the facility includes sand and gravel mining/processing. Also, the City of Barstow maintains a sewage treatment plant and effluent disposal ponds adjacent to the property. Other surrounding land is generally unused and undeveloped desert land. Results from field efforts has shown the groundwater contamination at both Yermo and Nebo to be the major environmental concern.

A Technical Review Committee (TRC) was established in FY91 and meets on a regular basis. A Community Relations Plan (CRP) was completed and an Information Repository established in 1991.



Current Status Of Sites

Studies Underway	41
Cleanups Underway	0
Response Complete	0
TOTALS	41

Currently, 41 sites are in a study phase, of which 39 sites are CERCLA sites. All 39 CERCLA sites are in the Remedial Investigation/Feasibility Study (RI/FS) phase. Five removal actions have been completed. One Interim Remedial Action (IRA) is underway. The remaining two Underground Storage Tank (UST) sites are in the Investigation (INV) phase.

Granulated Activated Carbon (GAC) Units have been installed on Base production wells to treat the organic solvents TCE and PCE found in the groundwater. At Nebo, the organic solvent TCE contamination found in an off base well resulted in a removal action to provide base water to three affected families. At Yermo, it is also clear that the organic solvents TCE and PCE well above Maximum Contaminant Levels (MCLs) are migrating off base and must be remediated, and recently a removal action was performed installing carbon filtration for two affected off-base families.

In the future, at the CERCLA sites, all RI/FSs are expected be complete by the end of FY98. Corrective Action (CA) will be completed at one UST site in FY97 and the other in FY98.

As the Installation Restoration Program (IRP) moves from study to cleanup, decisions affecting land use are now being made. Large portions of land will be tied up during construction of the infiltration galleries for the Yermo groundwater treatment. Landfills covering several acres of land will get capped, affecting long term use of the land. Some areas of land are going to institutional controls, limiting the land use. Because of this, the involvement from the activity is becoming more critical.

A success story during FY95, was the reduction in Phase II field effort for Operable Units (OUs) 5 and 6 from $12 million to $4 million. This was accomplished by negotiating a lesser scope (which still met Data Quality Objectives (DQOs)) with the regulatory agencies.

BARSTOW MCLB
RELEVANT ISSUES

ENVIRONMENTAL RISK

HYDROGEOLOGY - Groundwater is the only source of water for both domestic and industrial use in the area. Four documented historical contaminant sources have contributed to the degradation of groundwater quality in the vicinity of Barstow. They are effluent disposal from the city of Barstow Wastewater Treatment Plant (WWTP), irrigation water from the MCLB golf course at Nebo, waste discharged from the AT&SF rail yard at Barstow, and chlorinated solvents from the Nebo Main Base. The Mojave River recharges regional groundwater. However, groundwater conditions at the Yermo Annex are significantly different from the conditions at the Nebo Main Base. At the Yermo Annex, groundwater is encountered from between 133 and 147 feet below ground surface (bgs). At the Nebo Main Base, groundwater is encountered much shallower, between approximately 10 and 75 feet bgs in the central area of the Base and up to 175 feet bgs on the alluvial fan south of Interstate 40. In the bed of the Mojave River, groundwater has been encountered at a depth of only 4 to 5 feet bgs. The groundwater table has remained relatively stable at Nebo Main Base, but has been lowered about 70 feet at the Yermo Annex since the 1930's. The lowering of the water table can be attributed to regional groundwater withdrawal due primarily to agricultural irrigation wells with minor influences coming from private and public production wells. Currently, there are two active Yermo Annex production wells which are located within the Yermo contaminant plume. Both of these wells have carbon filtration systems to remove Volatile Organic Compounds (VOCs) to non-detectable levels. This water is currently used for various domestic and industrial uses at the Yermo Annex. The remaining production wells at the Yermo Annex are currently inactive. Production wells at Nebo Main Base have been inactive since about 1975.

The dry bed of the Mojave River is the dominant surface water feature in the Mojave Desert. A surface water drainage control system was built for the Nebo Main Base soon after the base was established. Assembly of storm drains, culverts, and paved areas distribute runoff to a main drainage canal at Nebo Main Base. This canal directs the water generally south to west and ultimately northeast across the Main Base to the Mojave River. Surface water discharge is less controlled and typically less of a problem at the Yermo Annex; however, in April 1993 the Mojave River flooded over its banks, deluging the southern portion of the Annex and destroying two monitoring wells.

NATURAL RESOURCES - Due to extensive land clearing, paving, and construction, native flora and fauna have been disturbed at Nebo and Yermo. Non-native species have been planted in some areas in both the Nebo Main Base and the Yermo Annex. Outside the boundaries of the Base, relatively unaltered natural habitats still exist. The Creosote Bush Scrub, Alkali Sink and Semi-dune vegetation communities surrounding the Yermo Annex and Nebo Main Base provide diverse habitats for many species of native and non-native wildlife. The principal native vertebrates in the area are rodents, reptiles and birds. Introduced species include pocket gophers, starlings, flickers, song sparrows, meadowlarks, and ravens. One endangered species and two threatened species have been identified on or near MCLB Barstow. The Mojave Tui Chub is endangered and the Mojave Ground Squirrel and the Desert Tortoise are both threatened species.

RISK - Baseline Human Health Risk Assessments and Ecological Risk Assessments are being conducted as part of the Remedial Investigations (RIs). Ten sites were ranked as high relative risk in the Department of Defense (DOD) Relative Risk Ranking System. The high ranking was due to contaminated groundwater for eight of the sites and contaminated soil for three of the sites.

REGULATORY ISSUES

NATIONAL PRIORITIES LIST - MCLB Barstow was included on the National Priorities List (NPL) on 21 November 1989 based on a Hazard Ranking System (HRS) score of 37.93. The listing was due to the detection of the organic solvent in groundwater monitoring wells located at the Nebo facility.

LEGAL AGREEMENTS - A Federal Facility Agreement (FFA) between the Department of the Navy (DON), the EPA Region IX, the California Department of Health Services and the California Regional Water Quality Control Board (CRWQCB), Lahontan Region, was signed in October 1990. The agreement established schedules and regulatory review turnaround times for key project milestones.

Thirty-eight sites were divided into six Operable Units (OUs) in the FFA. OU 1 (Site 37) and OU 2 (Site 38) address groundwater contamination at the Yermo and Nebo Annexes, respectively. OU 3 (Sites 18, 20, 21, 23 and 34); OU 4 (Sites 2, 5, 9 and 11); OU 5 (Sites 15-17, 19, 22, 24-32, 35 and 36); and OU 6 (Sites 1, 3, 4, 6-8, 10, 12-14, and 33) address contaminated soil at 36 sites that were identified in previous Installation Restoration Program (IRP) investigations. An additional OU, OU 7, will be added to address any sites identified in the RCRA Facility Assessment (RFA).

PARTNERING - A week long team building session was held in FY93. Regulatory agencies which attended were EPA Region IX, Cal-EPA and the CRWQCB, Lahontan Region.

COMMUNITY INVOLVEMENT

RESTORATION ADVISORY BOARD - A Restoration Advisory Board (RAB) has not been established yet for this base. Marine Corps base will establish a RAB if the public indicates an interest in establishing one. However, a Technical Review Committee (TRC) was formed in November 1990.

COMMUNITY RELATIONS PLAN - Community Relations Plan (CRP) was completed in 1991. Fact sheets are produced on a quarterly basis. A public meeting is held at least once a year. Turnout is usually low due to lack of public interest.

INFORMATION REPOSITORY - An Information Repository and an Administrative Record were established in 1991.

BARSTOW MCLB
HISTORICAL PROGRESS

FY83

Sites 1-33 - An Initial Assessment Study (IAS), equivalent to a Preliminary Assessment (PA), completed in September 1983, identified 33 potentially contaminated sites at MCLB Barstow. Sites 1-14 are located at the Nebo Annex, Sites 15-32 are located at the Yermo Annex and Site 33 is located at the Rifle Range which is contiguous with Nebo.

FY86

Sites 2, 5, 9, 11, 18, 19, 21, 23, 34 and 35 - A Confirmation Study (CS), equivalent to an Site Inspection (SI), completed in February 1986, addressed Sites 2, 5, 9, 11, 18, 19, 21, 23 and two additional sites located at the Yermo Annex (Sites 34 and 35). The study found pesticides and herbicides in soil and the organic solvent TCE in groundwater at Site 2; petroleum hydrocarbons and the pesticide DDT in soil at Site 11; petroleum hydrocarbons and heavy metals (arsenic, barium, beryllium, lead, and vanadium) in soil and petroleum hydrocarbons, the organic solvents dichloroethane and ethylene dibromide in groundwater at the Sludge Waste Disposal Area (Site 18); and heavy metals (arsenic, lead, and vanadium) in soil and petroleum hydrocarbons in groundwater at the Industrial Waste Disposal Area (Site 21); the chemical additive PCB in sludge at Site 34; and no evidence of heavy metals contamination in soil at Site 35. (Metal-contaminated sandblast grit had been suspected at Site 35, a Class III Landfill.) The report found no or insignificant levels of contamination at the Chemical Storage Area (Site 5); the Fuel Disposal Area (Site 9); the First Hazardous and Low Level Radiological Storage Area (Site 19); and the Landfill Area (Site 23).

FY89

Site 37 - An Action Memorandum (equivalent to an Interim Record of Decision (IROD)) was completed in July 1989 for installation of an activated carbon groundwater treatment system to remove volatile organic contaminants from the Yermo drinking water system. The system will continue through FY97 and has been effective in removing volatile organic compounds (VOCs) to below detection limits.

FY90

Sites 37 and 38 - In partial response to a Cleanup and Abatement Order issued in July 1989, a study was conducted in February 1990 to determine whether contamination from on-site operations had adversely impacted drinking water supplies in the vicinity of Yermo Annex and Nebo Annexes. The results of the study indicated that although trace amounts of volatile organic compounds were detected in two of 17 off-site wells, the detected concentrations did not pose a human health risk and were well below federal and state drinking water standards. The off-site wells are scheduled for continued monitoring during the Remedial Investigation (RI).
Site 38 - An SI was completed.

FY91

Site 36 - Another new site, the Proposed Vehicle Maintenance Shop, was identified in 1991. Although no SI was done at this site, petroleum products were found in the soil and the site was recommended for a Remedial Investigation/Feasibility Study (RI/FS).
RCRA Sites - A Preliminary Review/Visual Site Inspection (PR/VSI) Report was completed in August.

FY92

UST 01 - Forty-one Underground Storage Tanks (USTs) were removed in June 1992.

FY93

Sites 18 and 29 - A removal action involving the removal of industrial waste sludge was completed in FY93 at the Sludge Waste Disposal Area (Site 18) and at the Sludge Storage Area (Site 29).
Sites 37 and 38 - An Interim Remedial Action (IRA) was completed in June 1993 at OU 2 (Site 38) that provided water to three families using water from an off-base well contaminated with the organic solvent TCE. Efforts are underway to improve the water supply at Operable Unit (OU) OU 2 and to provide a water supply to residents affected by OU 1 (Site 37). An alternative water supply is expected to be provided through FY20. A treatability study at Site 37 using a Pilot Extraction Well and Air-Sparging system was performed in FY93 to determine the appropriate removal required to control off-base migration of contaminated groundwater.
Site 35 -The percolation ponds continue to be aerated and a filter was installed in FY93 to remove the organic solvent tetrachloroethylene from water before discharge to the ponds. This is expected to continue until FY98, if sampling indicates tetrachloroethylene concentrations above the state action level.

FY94

Site 34 - A removal action to remove soil contaminated with the chemical additive PCB was conducted.
Site 2 - A removal action to remove contaminated soil was completed.

PROGRESS DURING FISCAL YEAR 1995

FY95

OU 7 - A RCRA Facility Assessment (RFA) at MCLB Barstow was initiated and is expected to be completed by EPA Region IX in August 1996. It is planned that sites identified during the RFA as needing further action will be investigated under CERCLA as OU 7 in an RI/FS.
Sites 1-38 - RI/FSs were underway.
OU 1 (Site 37) - An Extraction Well and Air-Sparging system is being implemented at OU 1 and will operate until FY20. A time critical/ emergency removal action was conducted to provide carbon filtration of wells for private residents off Yermo Annex.
UST 2 - An Investigation (INV) was completed. UST 2 consists of approximately 70 additional tank locations that the California Regional Water Quality Control Board (CRWQCB), Lahontan Region, is requiring to be removed and tested. Ground Penetrating Radar confirmed the existence of only seven tanks which will be removed in FY96.

PLANS FOR FISCAL YEARS 1996 AND 1997

FY96

OUs 1-4 (Sites 2, 5, 9, 11, 18, 20, 21, 23, 34, 37 and 38) - RI/FSs will be completed at 11 sites. Records of Decision (RODs) will be completed.
Sites 39-99 - An RFA is underway at 61 sites and scheduled to be completed in FY96. Those sites requiring further action will be studied in an RI/FS under the CERCLA program.

FY97

Sites 1, 3, 4, 6-8, 10, 12-17, 19, 22, 24-33, 35 and 36 - RI/FSs will be completed at 26 sites. RODs will be completed.
Sites 2, 19 and 20 - Remedial Design (RD) will be completed.
UST 2 - Corrective Action (CA) will be completed (removal of seven tanks).
Sites 5, 9, 11, 18, 21, 23, 34, 37 and 38 - RD will be initiated at 9 sites and completed in FY98.
Sites 2 and 20 - Remedial Actions (RAs) will be initiated and completed in FY98.
UST 1 - A CA will be initiated and completed in FY98.

BARSTOW MCLB
PROGRESS AND PLANS

CERCLA	FY94 and before	FY95	FY96	FY97	FY98	FY99	FY00	FY01 and after
PA	33		1					
SI	11							
RI/FS			11	26	1			
RD				3	9	25	1	
RA				1	2	10	26	
IRA	5(5)			1(1)	1(1)			2(2)
RC				1	1	6	23	8
Cumulative Response Complete				3%	5%	21%	79%	100%

UST	FY94 and before	FY95	FY96	FY97	FY98	FY99	FY00	FY01 and after
ISC	1							
INV			1	1				
CAP								
DES								
IMP				1	1			
IRA	1(1)							
RC								2
Cumulative Response Complete								100%